

CO₂ Instructions

Congratulations on the purchase of our carbon dioxide (CO₂) system. Its unique design and top quality components make it the best CO₂ enrichment system available to the home gardener. Check all your parts carefully against the diagram and components listed below.

**PLEASE READ ALL DIRECTIONS CAREFULLY
BEFORE SETTING UP YOUR SYSTEM.**



SETTING UP YOUR SYSTEM

- IMPORTANT!** Before attaching the regulator to the CO₂ tank, slowly open the tank valve wide open for 3-5 seconds to blow out any sediment that may be in the tank valve. Reclose the valve tightly. *Whenever you are opening the tank valve, do it extremely slowly to avoid damaging the inner seals in the regulator.*
 - Make sure the washer is seated evenly in the regulator valve. Then attach regulator assembly to tank.
- DO NOT OPEN THE TANK VALVE YET.**
- Insert the shorter extension tube into the plastic fitting on the back of the flowmeter.
 - Take the other end of the extension tube and insert it onto the "T" fitting as shown.

DISTRIBUTION RING

The distribution ring is designed to be suspended above the plants in a circular pattern.

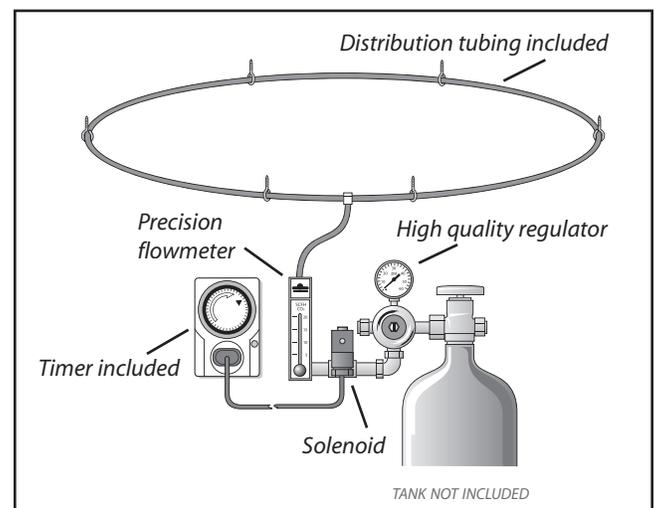
- First screw the eyelets in according to the diagram.
- Then thread the tubing through them in a circular pattern over your growing area.
- Connect the return end to the other side of the "T" fitting.

CO₂ is heavier than air and will spread downward from the distribution points. *Make sure the distribution tubing is secured and does not interfere with your lighting or light movement systems.*

ADJUSTING THE REGULATOR

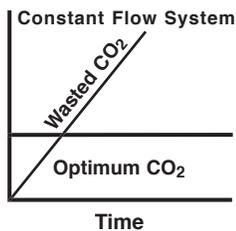
Once the system is securely attached and set up, your regulator can be adjusted.

- Plug your solenoid cord into the timer and rotate the dial until the tabs are in an "ON" position.
- Very, very slowly* open the tank valve until it is fully open.
- Now, using a screwdriver and a crescent wrench adjust the PSI gauge so it reads 30 PSI.
- Tighten the locknut.
- Unplug the solenoid valve.



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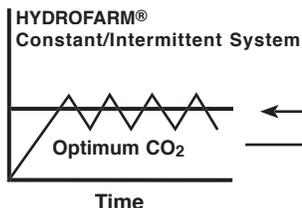
Our CO₂ systems are guaranteed to the original owner for 3 years from the date of purchase. Misuse, abuse, or failure to follow instructions are not covered. If you have a problem, recheck your system and timer to isolate the problem. If this doesn't remedy the situation, call the place of purchase to get a Return Authorization for the faulty part. Send only that part. Unauthorized returns will not be accepted. Save your receipt/invoice — a copy is required for all warranty work.



One of the unique features of our system is its ability to raise the CO₂ up to the appropriate level each day when your lights come on and then maintain it. CO₂ is an essential ingredient for photosynthesis which is the main provider of energy for plant growth. Without enough carbon dioxide, plant growth will slow down or can actually stop. A lack of CO₂ can occur very easily in an enclosed growing area unless you can add a supplemental source of CO₂ gas.

CO₂ is an odorless, invisible, and non-flammable gas. It is also safe for humans in the maximum concentrations recommended for plant growth.

The average level of CO₂ in the atmosphere is about 300 PPM (parts per million). If the level decreases down below 200 PPM in an enclosed growing area, plant growth slows to a halt. Through the years of testing and research, the optimum enrichment level of CO₂ for plant growth has been agreed to be about 1500 PPM. This is assuming, of course, that there is plenty of bright light and a good growing system. With CO₂ enrichment, under good conditions, plant growth rates and flowering will increase 20-100%. CO₂ should be used from seedling right through harvest.



The easiest way to raise the CO₂ level is by the compressed CO₂ gas method with a tank. They come in 20 lb. and 50 lb. sizes and are available for rent at your local beverage supply, welding, or gas products company. Your local beverage supply is used to renting CO₂ tanks to small snack bar operators and usually charges less. Look in your local yellow pages for a supplier.

HELPFUL INFORMATION:

CO₂ Tank Quantities - A 50 lb. tank holds approximately 440 cubic feet of CO₂. If you multiply your flow rate per hour times the number of hours of "on" time, you will find out how long a tank will last.

PROGRAMMABLE TIMER SETTING

Set your timer to go on continuously for 2.5 hours each day when your lights turn on. This time period will bring your room level close to the desired range. After this period, set the timer to go off for 15 minutes, then on for 15 minutes. Repeat this on/off cycle throughout the lighted period until 1 hour before the lights turn off.

This means that every hour an 800 cubic foot room needs 1/3 (.333) cubic foot of CO₂ to replenish it back up to 1500 PPM. Because our system operates on a 15 minute OFF / 15 minute ON cycle, the flow rate setting should allow 0.1665 (or 0.2) cubic foot of CO₂ to be emitted within each 15 minute ON cycle.

DETERMINING A FLOW RATE

This is the basic formula for determining flowmeter settings:
 cubic ft. of growing area x .0012 = A A ÷ 3 = B B ÷ 2 = flowmeter setting

To determine the flow rate for your growing area, follow the steps outlined below.

Step 1 - Determine the cubic volume of your area:

Room height x width x length = cubic volume

Example: 8' high x 10' long x 10' wide = 800 cubic feet

Step 2- Take desired level of CO₂ (1500 PPM) and SUBTRACT existing CO₂; 1500PPM - 300PPM = 1200 PPM. This is the amount of CO₂ you need to add to raise the level to optimum.

Step 3 - Multiply your room volume x .0012 (1200 PPM) to determine how much CO₂ to add to your area.

Example: 800 cubic feet x .0012 = .96 cubic feet.

For practical purposes we will round this off to 1 cubic foot. This is the quantity of CO₂ to add in an 800 cubic foot size room to reach the desired 1500 PPM level.

Before continuing on to the next steps the following assumptions need to be established:

FIRST ASSUMPTION: The average growing area enriched to 1500 PPM of CO₂ will return to normal levels in about 3 hours due to plant usage and room leakage.

SECOND ASSUMPTION: When calculating the flow rate for any growing area, this usage and leakage of CO₂ should be compensated for in that particular area.

Step 4 - Now for the 800 cubic foot room, we take the approximately 1 cubic foot of CO₂ and divide it up over the 3 hour average period into 1 hour increments. There are 3 one hour periods in 3 hours.

1 cubic foot ÷ 3 = 1/3 cubic foot of CO₂ (.333)

To arrive at the appropriate flow rate setting we need to divide .333 by 2 (there are two 15 minute ON periods per hour) to reach the flow rate per hour (.333 ÷ 2 = 0.1665 cubic feet per 15 minutes of flow). For practical purposes, round this up to 0.2 cubic feet. This is the flowmeter setting.

After following the regulator adjustment steps, set the flow with the flowmeter adjusting knob as described above.

SYSTEM CHECK

Once the flow rate and programmable timer have been set, the system should be tested by plugging it in and slowly rotating the timer dial clockwise to check the on/off of the solenoid valve and the flow of CO₂ by checking the flowmeter setting.

TROUBLESHOOTING

1. In case of any problems, carefully reread all the instructions to make sure everything is set up properly.
2. Test the regulator assembly with some soapy water if you suspect any leakage.
3. Check all your connections up to the flowmeter.
4. **ALWAYS TURN OFF THE TANK VALVE BEFORE DETACHING ANY PARTS.** Check the solenoid valve's function by plugging and unplugging it directly to an outlet.
5. Any fitting leakage can be remedied by re-attaching firmly with some teflon tape which is available from your local hardware store.
6. Plug the system back into the timer and slowly rotate the dial clockwise to check its on/off functions.
7. If these steps don't solve your problem, contact the place of purchase to work out the problem and get a return authorization if necessary.